

# Prevalence and Determinants for Gestational Diabetes Mellitus (GDM) in Pregnant Females at high risk for GDM in a tertiary care center

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## ABSTRACT

**Background:** GDM represents a high risk factor in pregnancy. Prevalence of GDM is increasing globally. **Aims & Objectives:** To evaluate the prevalence and risk factors for gestational diabetes mellitus among pregnant females at high risk for GDM attending a tertiary care hospital. **Methods:** The present study was a prospective Observational study. Pregnant women between 24-28 weeks of gestation irrespective of the age and parity with risk factors like overweight, history of diabetes mellitus in first degree relatives, previous history of macrosomic baby or congenital malformations, history of difficult instrumental deliveries, polyhydramnios were included. Detailed history, physical examination and routine investigations were carried out. The screening was done by Glucose challenge test using 50gms of oral glucose. The women found positive on screening test were subjected to 3 hours, 100gm glucose tolerance test (GTT). **Results:** A total of 350 randomly selected pregnant females who met the inclusion criteria were included. Out of 350 women, 74 (21.1%) turned out to be positive for screening test. The screening test positive women when subjected to confirmatory test of GDM by oral glucose tolerance test, 22 (6.3%) women were found to have GDM. Factors associated with increased prevalence were increasing age(1.8% vs 5% vs 16% p=0.001 in age groups <25 , 25-29 and > 30 years respectively) , parity (10.6% vs 4.2% p=0.03 more than two children and less than or equal to two children respectively) , obesity(25% vs 2.6% p<0.05 Obese vs non obese ), those with history of previous abortion(5.2% vs 10.7% vs 25% p=0.013 ,no abortion, one abortion ,two or more abortion respectively), those with history of GDM in previous pregnancy( 57.1% vs 5.2 % p=0.001) and those with history of diabetes mellitus in first degree relatives(37.5 vs 5.6% p=0.001). **Conclusion:** The prevalence of GDM was 6.3%. GDM was found more commonly in those with higher age, parity, women with history of abortions during previous pregnancy, obese, those with history of GDM in previous pregnancy and those with history of diabetes mellitus in first degree relatives. Screening should be offered to all pregnant women especially women with risk factors.

**Keywords:** GDM, Prevalence, Risk factors.

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## INTRODUCTION

Gestational Diabetes Mellitus (GDM) is defined as carbohydrate intolerance of varying degrees of severity with onset or first recognition during pregnancy. The concept of GDM was first established by O'Sullivan and Mahan in 1964.<sup>[1]</sup> 3 to 5% of all pregnancies are complicated by glucose intolerance and 90% of these are detected as GDM whereas 0.5% were pregestational. The prevalence may range from 1 to 14% of all pregnancies depending on the population studied and diagnostic tests employed. The prevalence in south Indian women is 0.56%. There is a general consensus that the prevalence of GDM is increasing globally but

there is considerable controversy about the clinical importance of GDM and magnitude of its impact on mother and offspring. GDM represents a high risk factor in pregnancy.<sup>[2]</sup> GDM has profound effects on fetomaternal outcome. This study was designed with this background to assess the prevalence and risk factors for GDM in pregnant females at high risk of GDM.

### Aims and Objectives

1. To evaluate the prevalence and risk factors of gestational diabetes mellitus among pregnant females at high risk for GDM attending the Department of Obstetrics and Gynaecology, Sher-i-Kashmir Institute of Medical Sciences, Soura Srinagar.

## MATERIALS & METHODS

The present study was conducted in the Department of Obstetrics and Gynaecology, Sher-i-Kashmir

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Institute of Medical Sciences, Soura Srinagar over a period of one and a half years i.e. august 2014 to Janurary 2016. Patients with risk factors were divided into two groups i.e. CASES – positive for screening test, and CONTROLS – negative for screening test.

#### **Inclusion Criteria**

1. Pregnant women between 24-28 weeks of gestation irrespective of the age and parity with risk factors like overweight, history of diabetes mellitus in first degree relatives, previous history of macrosomic baby or congenital malformations, history of difficult instrumental deliveries, polyhydramnios, etc.
2. Informed consent.

#### **Exclusion Criteria**

1. Women having diagnosed glucose intolerance before pregnancy.
2. Women with history of GDM in previous pregnancy in whom abnormal blood sugar persisted after delivery.
3. Women with history of cardiac, respiratory, renal, hepatic diseases or on drugs like corticosteroids and progestogens.

Detailed history, physical examination and routine investigations were carried out. All the subjects who fulfilled the inclusion criteria were screened for GDM. The screening was done by GCT in the patients with risk factors for GDM using 50gms of oral glucose. The women found positive on screening test were subjected to 3 hours, 100gm glucose tolerance test (GTT). The glucose tolerance was assessed according to Carpenter and Coustan criteria. The 100gm, oral glucose in at least 400ml of water were administered in the morning after an overnight fast of at least 8 hours but not more than 14 hours and after at least three days of an adequate carbohydrate diet and physical activity, subjects were instructed to remain seated in the laboratory and not to consume anything. Gestational diabetes was diagnosed if two or more of following venous plasma values were met or exceeded.

Time	Blood Glucose Concentration (mg/dl)
Fasting (0 Hour)	95
One hour	180
Two hours	155
Three hour	140

#### **Statistical Analysis**

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Descriptive Statistics of data including the mean and standard deviation for numerical variables and the percentages of different categories for categorical variables was obtained. Frequency distribution tables and bar charts were

used for data presentation .Students independent t-test was employed for parametric data and for non – parametric data ,Chi-square or fisher's exact test, whichever appropriate, was used .P-value less than 0.05 was considered statistically significant.

## **RESULTS**

**Table 1: Showing prevalence of GDM in different age groups**

Age	GDM	Non-GDM	Prevalence	P-value
<25	2	109	1.8	<0.001*
25-29	8	152	5.0	
> 30	12	63	16.0	

\*Statistically Significant Difference [P-value<0.05]

**Table 2: Showing Factors associated with prevalence of GDM**

	GDM	Non-GDM	Prevalence (%)	P-value
<b>Parity</b>				
≤2	11	235	4.5	0.032
> 2	11	93	10.6	
<b>No. of Abortions</b>				
0	16	294	5.2	
1	3	25	10.7	0.013
≥2	3	9	25.0	
<b>GDM in previous pregnancy</b>				
Yes	4	3	57.1	<0.001
No	18	325	5.2	
<b>History of DM in First Degree Relatives</b>				
Yes	3	5	37.5	<0.001
No	19	323	5.6	
<b>Obesity</b>				
Yes	15	45	25	<0.001
No	7	258	2.6	

Statistically Significant Difference [P-value<0.05]

This study was carried out at the Department of Gynaecology and Obstetrics of Sher-i-Kashmir Institute of Medical Sciences (SKIMS) Srinagar. A total of 350 randomly selected pregnant females who met the inclusion criteria were subjected to oral glucose challenge test. Out of 350 women, 74 (21.1%) turned out to be positive for screening test. The screening test positive women when subjected to confirmatory test of GDM by oral glucose tolerance test, 22 (6.3%) women were found to have GDM and 52 (14.8%) were with abnormal screening test only. The prevalence of GDM in the study population was 6.3%. We also studied the various determinants of GDM in the study population. We observed that the prevalence of GDM steadily increased with age as shown in [Table 1]. The prevalence of GDM in women who had borne less than 2 children prior to current pregnancy was 4.5% as compared to the women with more than 2 children was 10.6% as shown in [Table 2]. The probability of GDM was correlated with the history of previous abortion/s; while women who did not have any abortion had 5.2% chance of having GDM, those who had one abortion had a chance of 10.7% of having GDM and women with history of two or more had a chance of 25% to develop GDM in

present pregnancy ( $p=0.013$ ) as shown in [Table 2]. The prevalence of GDM in women with previous history was 57.1% and with no such past history was 5.2% as shown in [Table 2] ( $p<0.001$ ). The prevalence of GDM was 37.5% amongst women with history of DM in first degree relatives, while women with no family history had a prevalence of 5.6% ( $p=0.001$ ) as shown in [Table 2]. The prevalence of GDM in obese women was 25% as compared to non-obese which was 2.6%,  $p$  value  $<0.01$  [Table 2].

## DISCUSSION

The present study was undertaken to find the prevalence and pregnancy outcome of GDM in patients at risk for GDM at SKIMS Maternity hospital, Srinagar. The study was conducted in 350 patients taken by simple random sampling. The patients were subjected to history and examination as per predefined criteria.

### Prevalence

In this study, out of 350 subjects, 74 were screened positive for GDM. The proportion of women with positive screening test was 21.1% as compared to 14-18% as reported in Fourth International Workshop conference on GDM. Further evaluation was carried out on these 74 women with 3 hour, 100gms glucose tolerance test and 22 of these finally proved to have GDM. Thus in the present study the overall prevalence of GDM was 6.3%. The prevalence of GDM varies depending upon the population studied and diagnostic criteria employed. Abha Jindal et al (2001) reported 9% prevalence of GDM in central India (Bhopal).<sup>[3]</sup> Fateema Jawed and Parvin Kanji (1996) reported 3.45% prevalence of GDM in Karachi in Pakistan.<sup>[4]</sup> Ramachandran et al (1994) reported 0.56% prevalence of GDM in Southern India.<sup>[5]</sup> The low prevalence in their study was probably due to significant drop out of screened positive subjects (67 out of 89 turned for OGTT). A prevalence ranging from 1 to 5% has been reported in some other studies by Damm et al (1992),<sup>[6]</sup> Weng et al (2002),<sup>[7]</sup> Metzger et al (1998),<sup>[8]</sup> and De Veciana et al (1995).<sup>[9]</sup> Prevalence of 7%, 3-12%, 1-14% has been reported by Bung et al (1991),<sup>[10]</sup> Carpenter and Coustan (1982),<sup>[11]</sup> American Diabetic Association (2002),<sup>[12]</sup> and Meyer et al (1994),<sup>[13]</sup> respectively.

### AGE:

In the present study prevalence of GDM increased with age i.e. 1.8% in women younger than 25 years, 5% in 25-30 years age group and 16% in females of age group more than 30.

Naylor CD et al (1997),<sup>[14]</sup> Dorn Horst et al (1998),<sup>[15]</sup> and Schmidh MI et al (2000),<sup>[16]</sup> reported that the prevalence of GDM is influenced by age of patients.

### Parity:

In the current study a statistically significant difference was observed ( $p$  value of 0.032) in the prevalence of GDM in women who were para less than 2 as compared to women who were para 3 or more (4.5 vs 10.6)

Naylor CD et al (1997),<sup>[14]</sup> found that prevalence of GDM increased with parity, 8.3% of women with a parity of 2 or less were found to have GDM in their study compared to 23.3% of those with a parity of 3 or more. Higher figures in their study were because the subjects with one abnormal value according to NDDG criteria were included in glucose intolerance group.

Dorn Horst et al (1998),<sup>[15]</sup> reported that both the prevalence of GDM and recurrence increases in subsequent pregnancies. Weijers et al (2002),<sup>[17]</sup> reported that women with GDM had significant higher maternal age prepregnancy BMI, parity and pregnancy induced hypertension.

### Abortion:

In the present study there was an increase in prevalence of GDM in women with previous history of abortion/s as compared to those who were not having such history. The prevalence of GDM in this study was 5.2%, 10.7% and 25% in women with no history of abortion, with one abortion, with 2 or more abortions respectively.

Naylor CD et al (1997),<sup>[14]</sup> reported that the prevalence of glucose intolerance was 14.5% and 9.3% respectively in women with and without any history of previous abortions.

### History of gestational diabetes mellitus in previous pregnancy:

In this study 57.1% women with GDM in current pregnancy had history of GDM in previous pregnancy.

Javanovic and Pettit (2002),<sup>[18]</sup> reported that risk of GDM recurring in subsequent pregnancies ranges from 60-90%. Mc Guire V et al (1996),<sup>[19]</sup> noted that women with history of GDM in previous pregnancy had 23 fold greater risk of developing GDM in subsequent pregnancies compared to women with no such history. UN Das (2001),<sup>[20]</sup> reported that weight gain and additional pregnancies increases the risk of diabetes following GDM.

### History of DM in first degree relatives:

In the present study, the women with history of DM in first degree relatives had a significantly higher prevalence as compared to women with no such family history (37.5% vs. 5.6%)

Damm et al (1992),<sup>[6]</sup> found that besides all factors the family history of DM in first degree relatives was a risk factor for GDM. American Diabetic Association (2002),<sup>[12]</sup> and Javanovic and Pettit (2002),<sup>[18]</sup> recommended that women with family history of GDM should undergo glucose testing as soon as possible in pregnancy.

**Obesity:**

In our study GDM was significantly more in obese vs non obese patients (25% vs 2.6%). Xiang, Buchanan et al (1998),<sup>[21]</sup> reported that 15.8% mothers with GDM were obese as compared to 7.3% in non GDM group. Coustan DR et al (1993),<sup>[22]</sup> found that there was a significant association between GDM and prepregnancy weight and BMI. Fourth International Workshop Conference of GDM reported that obesity is one of the clinical characteristics that is associated with high risk of GDM. Schmidt et al (2000),<sup>[16]</sup> reported prevalence of GDM to be 2.5%, 6%, 11.6% and 13.8% in lean, normal, overweight and obese women respectively.

**CONCLUSION**

The prevalence of GDM was 6.3%. GDM was found more commonly in those with higher age, parity , women with history of abortions during previous pregnancy, obese , those with history of GDM in previous pregnancy and those with history of diabetes mellitus in first degree relatives. Screening should be offered to all pregnant women especially women with risk factors.

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